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CENTRAL INTELLIGENCE AGENCY

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INFORMATION REPORT

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1. The Foundry Department of The Central Scientific Research Institute of Technology and Engineering (TsNIITMash) at Moscow carries out theoretical investigations, practical experiments, and factory tests of various kinds of castings. It designs experimental machines and appliances for the casting industry.

Personnel

2. Professor P.P. Berg, Dr. of Tech. Sc., is at present time the head of this department. Professor Berg has published many scientific treatises, among which should be particularly noted Foundations of the Study of Moulding Material, written by him before the war and recently revised with the addition of latest information. Berg was head of one of the groups of specialists who after the end of the war were sent to Germany to investigate the organization of the foundry industry in that country during the war. He visited many parts of Germany, including Silesia, Saxony, and Thuringia and after his return wrote a big report on the subject. K.V. Lyubavskiy, A.M. Lyass, V.A. Bereznyuk, N.P. Katsinskiy, V.M. Barinovskiy, and others accompanied Professor Berg. Besides technical documents, this group brought a number of different instruments and appliances, as well as specimens of different materials.

3. Following are the names of most of the scientists and engineers working in the Foundry Department:

Cand. of Tech. Sc.

B.Z. Chernyak
I.B. Kuzmanin
A.M. Lyass
S.E. Rozenfeld*

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L.I. Serebriyer
D.N. Tsitrin
S.S. Yudin

Engineers

V.M. Barinovskiy
P.K. Basantsev
N.N. Belousov
K.O. Bibilashvili
S.S. Butuzov
A.P. Dubrova
A.I. Dubrovskiy
E.E. Erenburg *
B.F. Feygelson
E.I. Fishbein *
A.I. Gimpelson
YaA. Ivanov
N.P. Katsinskiy
M.M. Levin
M.S. Lipman
K.L. Pokrovskiy
V.N. Saveiko
M.M. Shinsin
A.M. Shternberg
N.A. Sokolov
L.I. Sokolovskaya
F.N. Sykrankin
Sh. S. Taycher
B.Ye. Vagin
H.D. Vershinskaya
I.F. Voronov
N.A. Zhavoronkov
I.Zh. Zudin (also works in another dept)

*As received. Initials possibly "Ye" instead of "E".

T.A. Lebedev, professor, Dr. of Tech. Sc., often supervises certain investigations and experiments.

Activities

4. The Foundry Department has executed a great number of tasks, both theoretical and practical, which it would be impossible to enumerate in full. Subsequent paragraphs give some individual examples.

5. Under the guidance of Professor Berg, assisted by A.I. Gimpelson and others, the Foundry Department evolved a method of casting cutting tools. This method differs from other methods of manufacturing cast tools in that the clean castings obtained by it require no more than subsequent abrasive treatment and do not have to be worked by a cutting tool. This preserves the structure of the sub-surface layer of metal on the tool and increases its durability. Special moulding and core mixtures are used. Following is the composition of a specimen moulding mixture: Lyubertsy quartz sand - 95 per cent, dextrine - 1.5 per cent, white fireproof clay - 2.5 per cent, and linseed oil - 1 per cent. The steel used for casting is RF-1 and EI-262 brands. The electric furnace uses high-frequency current. Some of the tools produced by this method are: Simple cutting tools such as blades for various types of cutters, hole-boring tools such as drills, reamers, broach bits, face millers, etc, and cutting discs, cylinder millers, gear-wheel cutters, angle millers, etc. Tools cast in accordance with the TsNIITMash method when tested under factory conditions proved to be no worse, and in many cases better, than those produced by forging. Some

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works have already adopted this method. The Foundry Department continues to examine methods of casting tools, to search for new alloys, and to discover means of eliminating the need of tempering.

6. Besides the method described above, the Foundry Department has also worked out a method for the centrifugal casting of tools, utilizing sand and metal moulds, which is used for casting gear-wheel cutters, millers, drills, and other revolving tools.

7. A method has also been evolved for producing cast tools from burnt out patterns. Patterns which are made of wax are melted in the mould and burned out, the resulting cavity being filled with molten metal. This method is recommended by TsNIITMash only in special cases, e.g., when castings have a very complicated outline or when using alloys which do not lend themselves readily to mechanical treatment.

8. An appliance for testing moulding materials was designed in the Materials Testing Laboratory. This appliance enables one to determine the properties of moulding mixtures when subjected to high temperatures of casting (1300°-1400°). The limits of reliability when undergoing contraction or expansion can be ascertained. With the aid of this appliance it is possible to choose the most suitable composition of moulds for casting various metals. During testing, the recording device registers all the phenomena proceeding in the moulding material being tested. This appliance is being produced in series at the Experimental Factory of TsNIITMash, and has been adopted by many works. It was designed by Engineers A.M. Dubrovskiy, P.K. Basantsev, and M.M. Shinkin.

9. A.M. Lyass and I.A. Kumanin have published handbooks dealing with the choice of bonding materials for cores. These phamphlets also describe how various bonding materials, powders of different color, brought from Germany, had been analyzed in the laboratory by the luminescent method. The exact composition of the powders was determined. The luminescent analysis outfit was designed by V.F. Lyubatov. Following are some particulars:

Quartz lamp: PRK-4 brand.
Dimensions of light filter: 70 x 60 x 7mm.
Distance between light filter and table: 180mm.
Distance between axis and quartz burner and light filter: 85mm.
Dimensions of outfit: 285 x 210 x 285mm.
The inside is coated with ivory black (gollandskaya sazha)

10. Much work is done in the Centrifugal Casting Laboratory of the Foundry Department. During the war TsNIITMash carried out the centrifugal casting of steel chamber bushes (vitulka-kamora) used in munition factories, from U 10-a tool steel. The length of the bush was 237mm, external diameter 108mm, internal diameter 73mm. Casting took place on a horizontal centrifugal machine of TsNIITMash pattern, designed by Engineer B.Ye. Vagin. The machine has an electric motor of 2.2 kilowatt power at 1,440 r p m. The casting mould shaft revolves at 625, 1,000, and 1,610 r p m. Transmission from the motor shaft to the mould shaft is effected by V-belts. Length of machine together with motor is 1,750mm, width 820mm, height 1,050mm. It occupies an area of 1.5 sq m. A second machine designed by Vagin after the war is larger and more advanced.

11. A centrifugal machine for casting bushes and piston rings was designed in 1947 under the supervision of S.E. Rozenfeld. This machine has been widely adopted by many factories. Several TsNIITMash engineers went out to factories in order to set these machines in operation; S.B. Yudin was sent

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to the Krasny Dvigatel Works at Samarkand and to other factories.

12. Two centrifugal machines, which were later produced in small series, were designed by Engineers F.N. Syzrankin, head of the foundry of the Experimental Factory, S.S. Butuzov, and Ye.A. Ivanov. These machines are for casting cast-iron water pipes with a diameter range of 100-150mm and 200-250mm. To eliminate brittleness and to increase durability the pipes are tempered by heat treatment. The first of these machines was handed over to the Leningrad Metal Works imeni Stalin for factory testing. Results were very good. The same engineers designed two machines for casting sewer components in metal moulds.

13. In 1946 TsNIITMash solved the complicated problem of casting thin plates from cobalt stellite. These plates were intended for reinforcing the inlet rims of turbine vanes in the high-power steam turbine of the Leningrad Metal Works imeni Stalin. They were the first of such castings to be produced in the USSR. Up to that time plates like these were obtained in England from the firm of Metropolitan Vickers. The stellite was produced in a high-frequency electric furnace of 10kg capacity, actuated by a 70 kilovolt generator. The furnace charge was composed of the following metals: cobalt 60-65 per cent, chromium 25-28 per cent, silicon 2-2.5 per cent with the balance made up of iron. The stellite was cast in dry earthen moulds. Dimensions of the cast plates were 3 x 14 x 32mm.

14. A group of engineers headed by N.A. Sokolov is conducting investigations in chill mould casting. The investigations are supervised by Professor Berg.

15. Engineer A.M. Dubrovsky has designed an automatic control of the mould-thickening process on moulding machines. It is based on the direct control of the density of the mould packing during the process of thickening. The measurement of the density of packing is done by a hardness meter (tverdometr) or with the aid of small revolving ploughs embedded in the moulds. When the required density has been attained the jarring mechanism is disconnected.

16. B.Z. Chernyak is investigating the working of sandblast and other machines. M.S. Limpan is investigating problems of precision casting.

17. Investigations and experiments have been recently carried out in so-called casting with crystallization under piston pressure. An exactly weighed portion of metal is poured into a metal mould. The press plunger then presses the surface of the molten metal, causing all parts of the mould to be filled. This has an effect on the process of crystallization. Many experiments were carried out with very good results. It is thought that this method of casting will be widely adopted in factories.

25X1 [redacted] Comment: The general organization and activities of the Central Scientific Research Institute of Technology and Engineering (TsNIITMash), of which the Foundry Department forms a part, were described in [redacted] 25X1

25X1 [redacted]

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